

# Viking Mission Support

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*The release of a preliminary version of the Deep Space Network Operations Plan for Viking has initiated the operations support for the Viking Mission. This article emphasizes the operations support in the planning phases of documentation, scheduling, training, and testing.*

## I. Introduction

As the DSN moves ahead into the hardware and software implementation phases of Viking support, operations activity moves into advanced planning stages. Using the network configurations described in previous articles, and the known peculiarities of the current Viking Mission design, the operations organization must start to develop procedures, strategies, and operational techniques by which the DSN resources can be deployed to achieve the desired mission support. This article is the first in which the operational planning activity is emphasized, and this approach will continue through the actual mission itself with the regular reporting of in-flight mission support.

## II. Operations Documentation

The first operational milestone, the publication of the Network Operations Plan for Viking '75 Project, was completed on March 22, 1973. This preliminary version cov-

ered largely the DSN institutional facilities which will be used to support Viking '75. Its purpose was aimed mainly at project familiarization and education. The document covers Network Operations Support, Test and Training description, GCF Test and Training, GCF Configurations, and GCF Operations Procedures in detail. It will eventually cover detailed plans and procedures for test and training of the DSIF and Network Control System (NCS), configurations for the DSIF and NCS, and Network operations procedures.

In the past, the Network Operations Document has been divided into two separate sets of volumes for DSN operations and DSN test and training. The Network Operations Plan for Viking '75 incorporates a new philosophy in that everything is included in one document. This results in lower documentation costs by reducing the number of documents required from more than ten to just one. The document has been organized so as to facilitate locations of the various types of information .

### **III. Dual Carrier**

The decision to adopt the two-station alternative for the requirement for simultaneous dual uplinks will have a larger effect on operations than originally anticipated. Without the dual capability at the 64-m stations, a second 26-m subnet is required to support the Project. It will be used to cover the approaching Spacecraft B following the separation of Orbiter A and Lander A.

Commitment of an additional 26-m-diam subnet requires that it be supplied with equipment to establish a Viking '75 configuration and that it be tested and trained in advance of the committed support. Test and training will be conducted after launch and thus reduce somewhat the overall test and training load. Although this second 26-m subnet will support the mission for only 30 days during cruise, the tests and training effort must be no less than that performed at the prime stations.

The fact that all stations in the DSN, with the exception of DSS 51, will be committed for Viking support during the 30-day period places a burden on the scheduling of support for the other flight projects.

Even though the dual carrier investigation is continuing, and the problems may be resolved by launch, planning continues on the assumption that this capability is required for mission enhancement only.

### **IV. Viking '75 Orbital Configuration**

DSN Operations personnel have been working very closely with the DSN Manager and system engineers to produce a configuration which will allow a backup/failure strategy during orbital operations. As every item of available equipment will be utilized at the 64-m stations during orbital operations, a failure strategy becomes extremely important. By using equipment located at the conjoint stations in the case of DSSs 43 and 63 and at DSSs 11 and 14, a strategy has been formulated for a single-point failure. This strategy will be finalized and

included in the Network Operations Plan following publication of the DSN Preparation Plan for Viking '75 Project.

### **V. Voltage-Controlled Oscillator (VCO) Requirement**

A study has been conducted for the DSN Manager to determine the minimum number of VCOs required to support the Viking Mission. Since extreme doppler conditions during cruise will stress the standard VCOs to the limit of their operating capability, the study has included the possibility of a need for offset VCOs.

### **VI. Training**

DSSs 11 and 14 are scheduled to support Viking '75 Flight Operations System (FOS) verification and demonstration tests during the first half of 1975. In order to support these tests, the stations must be fully equipped, trained, and manned to support orbital operations. As actual orbit operations do not begin until nearly one and a half years later, the training effort will need to be repeated following launch.

Several ways of solving the manning problem, in order to support the FOS tests, have been considered. One would be to borrow personnel from other stations for support of the tests and then, upon completion, return them to their respective stations. This would maintain the number of personnel at a set level but reduce the strength of the nonsupporting stations. To increase the number of personnel to support the FOS tests would imply manning for orbital operations one and a half years in advance of the actual need. This problem continues to be studied in conjunction with the actual definitions of the FOS test requirements.

### **VII. Viking Unique Procedures and Strategies**

Work has started on several Viking unique strategies and procedures, particularly for lander acquisition and commanding. These will be reported in subsequent issues of this report.